
Coastal survey of eiders and other marine birds along the Hall Peninsula, Southeast Baffin Island, Nunavut

A. J. Fontaine, M. L. Mallory, H. G. Gilchrist and J. Akearok

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ABSTRACT

A survey to determine the abundance and distribution of marine birds along the coastline of the Hall Peninsula on southern Baffin Island, Nunavut was conducted in August and September 2000. Although marine birds were generally dispersed, they were more abundant on the southern shore of Hall Peninsula (Frobisher Bay) than either the eastern coast along Davis Strait or the southern coastline of Cumberland Sound. More species were observed in Frobisher Bay than elsewhere in the survey. Important concentrations of common eiders (*Somateria mollissima*) were observed in Ward Inlet, between the Barrow Peninsula and Loks Land, and in the Anderson Channel. Black guillemots (*Cepphus grylle*) and glaucous gulls (*Larus hyperboreus*) were also abundant whereas other marine bird species were uncommon. Quantitative surveys during the breeding season (June) are needed to refine our knowledge of the importance of these sites to marine birds.

RÉSUMÉ

Un relevé dans le but de déterminer l'abondance et la distribution des oiseaux marins le long du littoral de la Péninsule de Hall au sud de l'Île de Baffin, Nunavut fut conduit en août et septembre 2000. Quoique les oiseaux marins furent généralement dispersés, ils furent plus abondant le long du littoral sud de la Péninsule de Hall (Baie de Frobisher) que dans l'ensemble du reste du littoral soit la côte est dans le Détroit de Davis et la côte sud de la Baie de Cumberland. La diversité des espèces observées fut plus grande dans la Baie de Frobisher que partout ailleurs pendant le relevé. D'importantes concentrations d'eider commune (*Somateria mollissima*) furent observé dans la Baie de Ward, entre la Péninsule de Barrow et la Terre de Loks, et dans le Chenal Anderson. Les guillemots à miroir (*Cepphus grylle*) et les goélands bourgmestre (*Larus hyperboreus*) furent aussi abondant alors que les autres espèces d'oiseaux marins furent peu communes. Des relevés quantitatifs pendant la saison de reproduction (juin) sont requis pour perfectionner nos connaissances de l'importance de ces sites pour les oiseaux marins.

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1. INTRODUCTION

1.1 General

Recent evidence suggests that some populations of North American sea duck species are declining, and this has sparked concern over the status of many of these populations (Turner et al. 1996, Gilliland et al. 1999, McAloney 1999). In the case of eastern Arctic breeding species, there are few reliable estimates of population sizes or productivity (Turner et al. 1996, Gilchrist and Dickson 1999). Geographic relationships between breeding and wintering populations are also poorly understood (Reed and Erskine 1986). Harvest estimates are inadequate and their effects on populations are unknown (Merkel, pers. com., Greenland Institute of Nature). Moreover, generally little is known about the biology of this group of birds (Reed and Erskine 1986). Combined, these factors make eastern Arctic sea ducks especially vulnerable to population declines.

Typically, management of sea ducks has been fashioned after that of other waterfowl species which have quite different life histories (Goudie et al. 2000). The life history of sea ducks is characterized by a long life expectancy, delayed reproductive maturity, and low annual productivity (k-selected) whereas most other species of waterfowl have higher annual productivity and lower annual survival rates (r-selected) (Batt et al. 1992). These life history traits make sea ducks more sensitive to changes in adult mortality (Goudie et al. 1994). Furthermore, subsistence harvests (both during the breeding and wintering period in the Canadian eastern Arctic, Labrador and Newfoundland), guided hunts off the eastern North American seaboard, and commercial hunts for local markets of wintering eider populations off the western coast of Greenland all contribute to high rates of harvest. Considering other threats such as large-scale oil spills, chronic oil discharge off the Grand Banks of Newfoundland, contaminants, and coastal development, the sustainability of current harvest levels need to be quantitatively assessed. However this cannot be effectively accomplished without first acquiring the appropriate background information on distribution and abundance (Gilchrist and Dickson 1999).

Most sea ducks breed either in boreal or arctic regions and over-winter in coastal areas (Bellrose 1980). Consequently, the logistical problems and prohibitive costs associated with surveying these regions are largely responsible for the lack of information. Historical and current survey data on the abundance of sea ducks in the eastern Arctic (especially in southeastern Baffin Island) are very limited. To that end, we initiated this survey to gather needed information on the distribution and abundance of eiders and other marine birds along the coastline of the Hall Peninsula. This effort was intended to provide baseline data for population monitoring and to identify eider concentrations for future research plans, similar to recent survey efforts along the southern Baffin Island coast (Gilchrist et al. 1998, Gilchrist et al. 1999).

1.2 Southern Baffin Marine Bird Surveys

1.2.1 Historical

Early naturalist expeditions conducted specimen collections and recorded general observations on species habitat use and abundance relative to other species. Of the early naturalists working in southern Baffin Island, three expeditions contributed substantially to our knowledge on bird species of this region. Soper (1946), in his 1928-31 expeditions, concentrated his observations and collections along the Hudson Strait coastline from the Meta Incognita Peninsula west to the Foxe Peninsula, and north to Taverner Bay, but also made some observations in the interior around Nettilling and Amadjuak Lakes. Watson (1957) spent the 1953 field season with the Baird expedition in the interior of Cumberland Peninsula but he also collected observations along the coastal areas around Padloping Island in the early part of the breeding season. Macpherson and McLaren (1959) conducted their zoological work along the southern coast of the Foxe Peninsula in 1954 and 1955.

1.2.2 Recent

Although in "relative" proximity to major Nunavut communities, few marine bird surveys have ever been conducted in the coastal and inland areas of southern Baffin Island. The MacLaren Marex Inc. consulting firm conducted surveys of wintering birds using polynyas in Davis Strait and eastern Hudson Strait for the petroleum industry in the late 1970's (MacLaren Atlantic Limited 1978, MacLaren Marex Inc. 1979). Their work included observations around the tips of Meta Incognita and Hall Peninsula as well as a portion of Frobisher Bay and Cumberland Sound. Although well-structured, the survey performed by Reed et al. (1980) in the Foxe Basin was too far removed from the Hall Peninsula and the emphasis of their survey was too biased towards geese to be used as comparative baseline information. However, it does provide some good background information on the marine birds breeding in that region. Of more interest are the surveys conducted in 1998 and 1999 by G. Gilchrist and D. Kay (Gilchrist et al. 1998, Gilchrist et al. 1999) along the southern coast of Baffin Island between the west coast of Foxe Peninsula and Kimmirut. Initiated because of increasing concern for eider populations, their intensive survey of the nesting islands of this region provided us with data to which our own may be compared in the future. Furthermore, it will allow wildlife managers to form a clearer picture of the status of eiders in southeastern Baffin Island in addition to forming the basis for a framework of research.

Frobisher Bay and Cumberland Sound are two areas that have largely been overlooked in marine bird surveys. With continuing concern over eider populations, however, and the creation of a new CWS office in Iqaluit, the logistics of conducting these surveys became feasible. This report documents the first in a series of planned surveys based from Iqaluit in Frobisher Bay focused on marine birds populations of Baffin Island (particularly sea ducks).

2. METHODS

2.1 Study Area

The survey, conducted at the end of the breeding season of 2000, surveyed marine bird distribution and abundance along the coastline of the Hall Peninsula within Frobisher Bay and Cumberland Sound. Further surveys are planned in the fall of 2001 along the north and south coastline of the Meta Incognita Peninsula.

Frobisher Bay and Cumberland Sound have very high tides. The Peninsulas on southeastern Baffin Island form the beginning of the Arctic Cordillera, so most of this region is mountainous, with many steep cliffs. As well, there are many regions of rocky island archipelagoes, small and suitable for eider nesting. Vegetation is sparse, consisting of mosses, sedges (*Carex sp.*), and scattered arctic flowers. More protected pockets support arctic willows (*Salix sp.*).

2.2 Survey Coverage

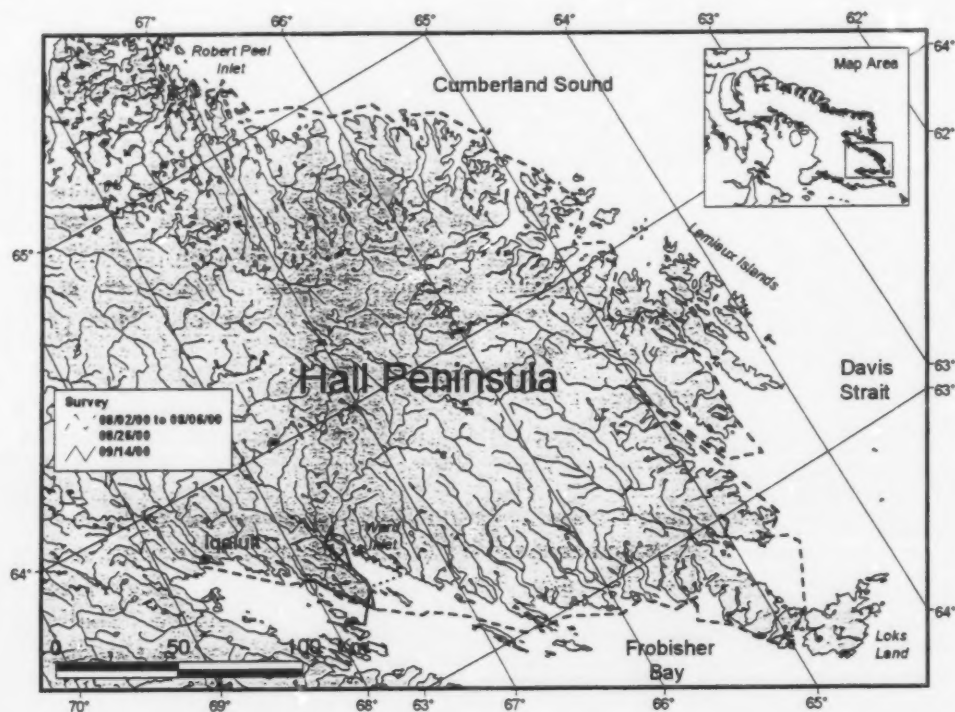
The survey was split in two survey periods, the first covered all of the survey area except Ward Inlet, and the second covered Ward Inlet (Figure 1). The first survey was conducted over a period of five days between August 2 and 6, 2000 (Figure 1). Approximately 860 km of mainland and island coastline was covered. Starting from Iqaluit (63°45'N, 68°32'W), the first observations were recorded along the southern shore of the Becher Peninsula. From there, the survey covered the southern coast of the Hall Peninsula in Frobisher Bay, cutting across the mouth of Ward Inlet, then through channels and inlets at the eastern tip of the Hall Peninsula. From there, we traveled through the Lemieux Islands, and then along the northern shore of the Hall Peninsula in Cumberland Sound to Robert Peel Inlet (65°11'N, 66°54'W).

The area around Ward Inlet (63°29'N, 67°37'W) was surveyed on two separate field trips, the first on August 26, 2000 and another on September 14, 2000 (Figure 1). The first and main survey covered all the coastline and bays within Ward Inlet and the tip of Becher Peninsula. As part of another study, an opportunity arose to conduct a second survey within Ward Inlet. This opportunity was used to survey the small tidal lake within Augustus Island, the shore of Augustus Island, as well as some of the islands north of the Fletcher Channel.

In addition to the two surveys, we included a data point for a small flock of four Sabine's Gull observed in Frobisher Bay on September 4, 2000 by J. Akearok while on a hunting trip, because they are seldom seen in this area.

Figure 1

Location of the marine bird survey lines along the coastline of Hall Peninsula, Baffin Island, Nunavut in 2000.



2.3 Surveys

The surveys were conducted by motor boat at an average speed of 20 km/h, usually keeping parallel and close to the shore (usually about 10 meters) allowing good observations and wildlife identification. On the first survey a 22 foot freighter canoe with a 50 HP outboard motor was used, and on the second survey a 27 foot aluminum boat with two 100HP outboard motors was used. Teams of two people were used on both surveys, one person as a navigator steering the boat and the other person as an observer sitting at the front of the boat recording the observations. Survey course was maintained using 1:250 000 scale topographic maps. All data, observations, and notes were entered into a field notebook. An attempt to cover all bays, inlets, and islands along the survey route was made; however due to local ice conditions, especially at the tip of the Hall Peninsula, some areas were not completely covered.

The observer recorded the species, the number of individuals present in the group or an estimation of group size when large numbers were present, as well as the latitude and longitude of the observation using a hand held Garmin model 12 GPS unit. All observations were recorded regardless of distance from the survey path. All marine bird species observed were recorded. Some mammal observations were also recorded, but,

sampling effort for mammals was not standardized. Consequently, we include incidental mammal observations in this report only for general interest purposes.

The first portion of the survey, August 2 to 6, 2000, was characterized by good weather for boat surveys. There was very little cloud cover, light winds, low waves, no precipitation, and temperatures reached about 15°C daily (temperature varied by position in the Bay, proximity to ice, etc.).

In southern Baffin Island, late August and early September are characterized by cold and rainy weather. The weather during the second portion of the survey was no exception. The weather on August 26, 2000 was cold with a high of 8°C, intermittent rain and strong winds and waves. Light winds, strong waves and complete cloud cover left over from overnight rain showers characterized the morning weather on September 14, 2000. By the afternoon, winds had died down, temperature had increased from 5°C to 7°C, and cloud cover was down to 50%.

2.4 Analysis and Data Interpretation

Survey results were entered into a database, geo-referenced, and presented graphically using maps generated with ArcView 3.2. Before importing the data into ArcView, same species locations in relative proximity to one another were grouped because of resolution limitations when viewing data at a small scale in topographic layouts. When preparing the map layouts for species with a large number of observations, we presented the data in a single theme using graduated symbols (circles) classified by group size according to the following grouping scheme: 1-5, 6-19, 20-50, 51-100, >101. For species with few recorded observations, the data were grouped in a theme each for birds and mammals and presented in map layouts using unique symbols for each species irrespective of group size. For birds, all but one case were observations of single individuals, but, group size of mammal observations was variable.

3. RESULTS AND DISCUSSION

3.1 General

We recorded a total of 3823 marine birds and 90 marine mammals during the Hall Peninsula survey (Table 1). Table 1 summarizes the number observed for each species in Ward Inlet and around the Hall Peninsula exclusive of the Ward Inlet data, as well as the total numbers observed for the whole survey. We present the data for Ward Inlet separately because this portion of the survey was more intensive and thorough. While conducting the first portion of the survey, survey effort was probably biased towards sea ducks than other observed species. Refer to Appendix A for a complete list of observations and locations by species.

Close to 70% of the observations were recorded in Frobisher Bay although the Bay represented less than 40% of the total region covered. At a coarse level, there are similarities between the distribution of animals in the Nunavut Atlas (Riewe 1992) and our data. Wildlife distribution in Frobisher Bay seemed to be more continuous whereas it appeared more patchy in Cumberland Sound. General habitat conditions in Frobisher Bay may be more favorable than in Cumberland Sound. Topographic relief on the eastern and northern side of the Hall Peninsula is much steeper than on the southern side, which would mean deeper water and presumably steep, poorly vegetated rocky slopes. In turn, this would provide poor feeding habitat for sea duck species requiring shallow waters and poor breeding habitat especially for species breeding in lakes (e.g. king eiders and long-tailed ducks) or islands (e.g. common eiders). Another explanation for the differences in wildlife distribution would be the presence of pack ice at the eastern tip of Hall Peninsula during the first portion of the survey, which prevented a complete survey of that area. However, this would not explain the patchy distribution of the observations in Cumberland Sound.

Table 1. Number of birds observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Species	Ward Inlet	Hall Peninsula (excl. Ward Inlet)	Whole Survey
Birds			
<i>Gaviidae</i>			
Red-throated loon (<i>Gavia stellata</i>)	2	0	2
Pacific loon (<i>Gavia pacifica</i>)	9	0	9
Common loon (<i>Gavia immer</i>)	4	3	7
<i>Procellariidae</i>			
Northern fulmar (<i>Fulmarus glacialis</i>)	0	1	1
<i>Anatidae</i>			
Canada goose (<i>Branta canadensis</i>)	21	89	110
Common eider (<i>Somateria mollissima</i>)	233	1244	1477
King eider (<i>Somateria spectabilis</i>)	0	137	137
Long-tailed duck (<i>Clangula hyemalis</i>)	2	69	71
Red-breasted merganser (<i>Mergus serrator</i>)	1	0	1
<i>Falconidae</i>			
Gyr Falcon (<i>Falco rusticolus</i>)	2	0	2
<i>Laridae</i>			
Glaucous gull (<i>Larus hyperboreus</i>)	1175	272	1447
Sabine's gull (<i>Xema sabini</i>)	0	4	4
<i>Alcidae</i>			
Thick-billed murre (<i>Uria lomvia</i>)	0	2	2
Black guillemot (<i>Cephus grylle</i>)	25	528	553
Total	1474	2349	3823
Mammals			
Harp seal (<i>Phoca groenlandica</i>)	22	55	77
Ringed seal (<i>Phoca hispida</i>)	5	0	5
Bowhead whale (<i>Balaena mysticetus</i>)	0	7	7
Minke whale (<i>Balaenoptera acutorostrata</i>)	0	1	1
Total	27	63	90

3.2 Eiders

Over 1500 eiders, were observed during this survey (Table 1). Three areas supported over 75% of the eiders surveyed. Ward Inlet, the Anderson Channel, and the shoreline and islands between Barrow Peninsula and Loks Land held 233, 243 and 657 eiders respectively (Figure 2). This latter area has been identified as important for nesting eiders (H.G. Gilchrist pers. comm.). In Ward Inlet, 45 common eiders were observed on the tidal lake on Augustus Island during the September 14 survey, most were molting males. King eiders were all found within Frobisher Bay and most were observed on the southern shore of Becher Peninsula and adjacent islands (Figure 3). Except for the Anderson Channel, the distribution of eiders found in this survey closely followed that of the Nunavut Atlas (Riewe 1992).

The distribution of eiders in Cumberland Sound was discussed at a meeting held in Pangnirtung between the CWS and the Pangnirtung Hunters and Trappers Association in February 2000 (M.L. Mallory pers. com.). Members of the association stated that there were many eider nesting colonies on islands in fjords and bays in Cumberland Sound and identified Kangilo Fjord, the tidal flats at the top of Kingnait Fjord, and a small island off Blackhead Island as being important breeding areas.

The number of king eiders observed appears low, but, in terms of relative abundance we suspect it accurately represents the local population. King eiders breed in small lakes and ponds in lowland areas and eventually broods make their way to salt water prior to fledging (Suydam 2000). Lowland areas are uncommon in southeastern Baffin Island and the survey was completed while many broods were still quite young. Of the 186 common eiders surveyed in Ward Inlet on August 26, 13 were class IIA ducklings and 45 were class IIB ducklings. King eiders have a breeding cycle similar to common eiders (Goudie et al. 2000, Suydam 2000). King eiders were observed only in the first portion of the survey (August 2 to 6). This corresponds to the middle of the molt migration period when most males and non-breeding females migrate to western Greenland while breeding females would still be inland either with young broods or in late incubation (Suydam 2000). Consequently, it is reasonable to assume that there would be few breeding king eiders in the surrounding inland freshwater areas and that since it was still early in the breeding season, few breeding female king eider and their broods would have reached the coastline by the time of the survey. Most males and non-breeding females would be in the process of leaving the region.

Definite population estimates for the eastern Arctic common and king eiders are unavailable. Most information suggests declines ranging from steady to drastic; especially in western Greenland wintering populations (Goudie et al. 2000, Suydam 2000). It is suspected that population declines are a result of over-harvesting because of liberal hunting practices directly related to poor reactive management (Goudie et al. 2000). A recent computer modeling analysis of common eider population dynamics of the eastern Arctic strongly suggests that annual harvest levels in both Greenland and Maritime Canada are not sustainable (CWS, in prep.).

3.3 Long-tailed duck (oldsquaw)

Only three flocks having 2, 9, and 50 birds respectively were observed, all within Frobisher Bay (Figure 4). The low densities observed may be explained by their breeding habits. Oldsquaws nest well dispersed at low densities in arctic lowland areas interspersed by small freshwater ponds (Bellrose 1980). Given the scarcity of this habitat in southeastern Baffin Island, relatively few birds should be observed in the region and we suspect that the numbers observed were representative of their relative abundance. The eastern oldsquaw population appears stable (Kehoe 1996, CWS 1999). However, the western population has decreased by 70% since the 1960's at a rate of 2% per year (CWS 1999).

3.4 Canada goose

All but one flock of 40 birds were found on the southern shore of the Hall Peninsula (Figure 5). Three of the flocks had 20 birds or more. In the eastern Arctic, Canada geese prefer breeding in lowland tundra and most of the birds found on Baffin Island can be found in the Foxe Basin area and the Great Plain of the Koukdjuak (Bellrose 1980). Given the scarcity of this habitat in eastern Baffin Island, low numbers of geese were expected. However, Inuit hunters in both Iqaluit and Pangnirtung report increasing numbers of Canada geese in recent years. Therefore, the flocks we observed were probably non-breeding pairs, failed breeders, or molt migrants from southern breeding areas.

3.5 Black guillemot

This species was well-dispersed with numerous flocks of 20-50 birds all around Hall Peninsula and small flocks around Ward Inlet and neighboring islands (Figure 6). Most were seen in small flocks (swimming or flying) of 2 to 10 individuals. These flocks were grouped into one larger observation for data presentation.

3.6 Glaucous gull

Large flocks were present in Ward Inlet (over 80% of the birds were surveyed in this area) and other flocks were well-dispersed over the Hall Peninsula coastline and islands (Figure 7). One of the flocks in Ward Inlet was estimated to have 300 birds while another was composed of over 700 birds. Distribution of gulls along the Hall Peninsula was similar to the distribution shown in the Nunavut Atlas (Riewe 1992). However, the Nunavut Atlas documents numerous colonies in Cumberland Sound and we suspect that we under-represented gull abundance because this species is ubiquitous, and we were focused on sea ducks. For most of the survey, particularly in Cumberland Sound, gull locations may have been slightly off route or were probably missed.

3.7 Loons

All loons observed were found in Frobisher Bay and all but 3 common loons were in Ward Inlet or its vicinity, generally in small groups ranging in size from 1 to 5 (Figure 8). A total of 9 Pacific loons, 7 common loons and 2 red-throated loons were observed. Low numbers of loons were expected because at the time of the survey most would still be in inland, freshwater lakes with their broods (Godfrey 1986). Because inland freshwater lakes are scarce in southeastern Baffin Island, these species are probably not common or abundant breeders here.

3.8 Other birds

Other bird observations were of single individuals except for a small flock of four Sabine's gulls, and all observations were recorded in Frobisher Bay (Figure 9). These species were the gyrfalcon, northern fulmar, red-breasted merganser, Sabines's gull, and thick-billed murre.

3.9 Mammals

Mammal observations presented here are incidental and are included for general interest purposes. These *should not* be considered a representative survey of mammal distribution and abundance.

Two species of seals, harp and ringed seals, were observed, all near Ward Inlet in Frobisher Bay (Figure 10). Harp seals were in large groups of 10 to 40 seals and in all 77 harp seals were observed. Ringed seals were only observed as individuals or a small group of three; in all only five were recorded.

Two species of whales, bowhead and minke whales were observed (Figure 10). All bowhead whales were observed in Cumberland Sound between Robert Peel Inlet and Moodie Island and the minke whale was observed east of the Blunt Peninsula. In all, two trios of Bowhead whales as well as a lone Bowhead and a lone minke whale were observed.

4. CONCLUSION

This first phase report improved our knowledge of the abundance and distribution of sea ducks and other marine birds on the coastline of the Hall Peninsula. Because of the importance of islands in Ward Inlet and between the Barrow Peninsula and Loks Land for breeding common eiders, future efforts will involve intensive quantitative surveys early in the breeding season to better assess reproductive effort in these regions. However, southeastern Baffin Island and its bird fauna, especially Frobisher Bay and Cumberland Sound, remains a region of the Arctic that is poorly studied. Adequate and intensive surveys of the marine bird species of Frobisher Bay and Cumberland Sound are still required if we wish to gain baseline information for monitoring these populations and ensuring sustainable management. The results of this survey warrants an increased level of study in this region.

Into September, eiders were still well-dispersed along the coast of the region. We are unsure if or when large rafts form, perhaps not until they get to wintering areas. We suspect that eiders may use the southern Baffin coastline for molting to a greater extent than was previously reported. Also of note is the observation of a flock of predominantly molting male common eiders on the tidal lake on Augustus Island in Ward Inlet which suggests the use of protected tidal lakes by flightless males. These observations highlight both our lack of information on the spatial and temporal habitat association of marine birds in this region, as well as the need to determine these relationships promptly to effectively understand and manage the declines in some species.

Through the efforts of the new Sea Duck Joint Venture and the Circumpolar Eider Conservation and Action Plan, the profile of sea ducks has already increased. Hopefully, the new research and monitoring initiated under these plans will improve future management. Partnerships and agreements with communities harvesting these species for subsistence purposes as well as the natural resources agencies of other governments (especially Greenland where most of the eastern Arctic eiders over-winter) should form an important aspect of any new management plan.

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6. FIGURES

- Figure 2** Distribution and abundance of common eiders (*Somateria mollissima*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 3** Distribution and abundance of king eiders (*Somateria spectabilis*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 4** Distribution and abundance of long-tailed ducks (*Clangula hyemalis*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 5** Distribution and abundance of Canada geese (*Branta canadensis*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 6** Distribution and abundance of black guillemots (*Cepphus grylle*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 7** Distribution and abundance of glaucous gulls (*Larus hyperboreus*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 8** Distribution of loons (*Gaviidae*) on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 9** Distribution of uncommon bird species on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.
- Figure 10** Incidental observations of marine mammals on the marine bird survey of the Hall Peninsula coastline, Baffin Island, Nunavut, August and September 2000.

Figure 2

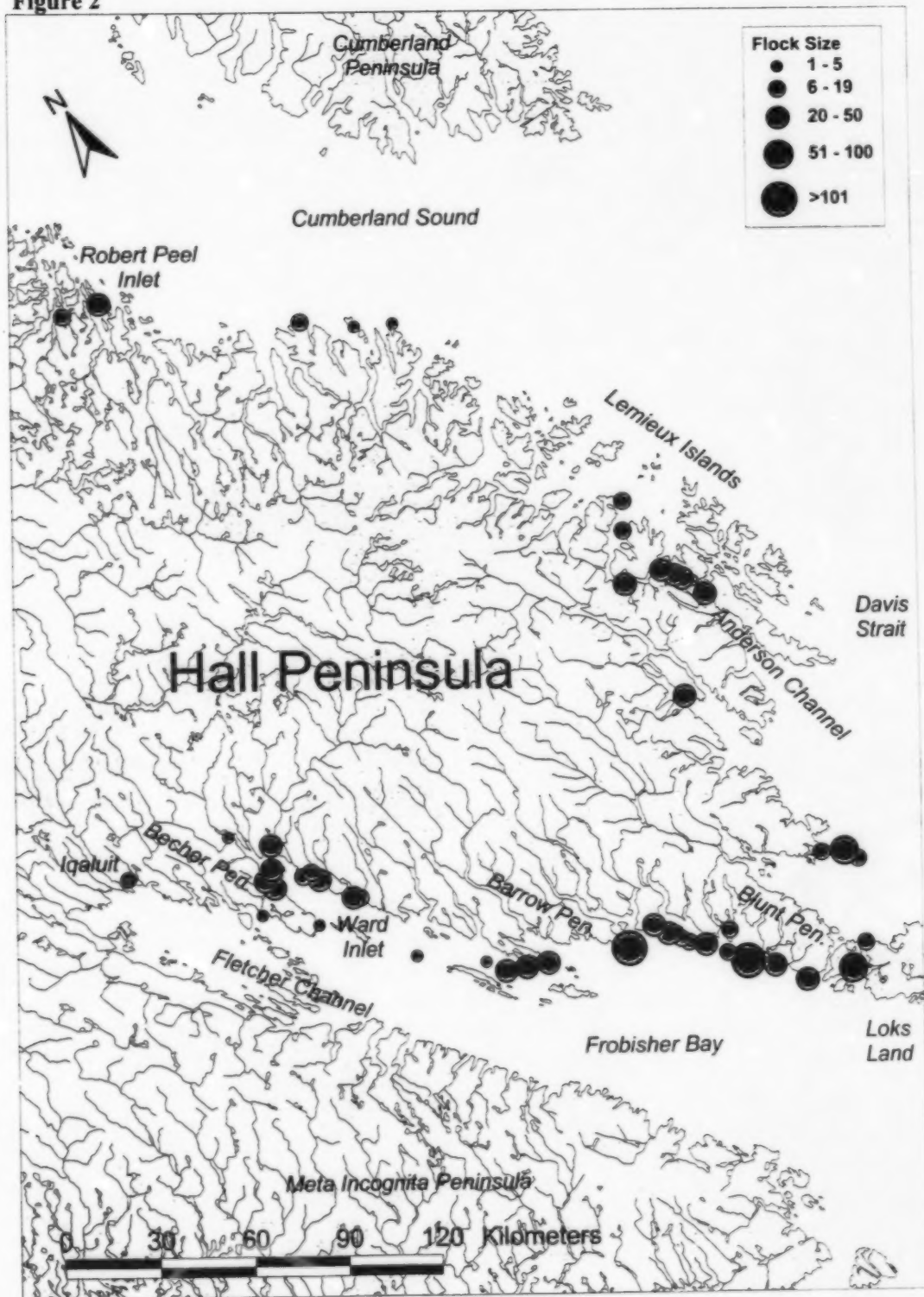


Figure 3



Figure 4



Figure 5



Figure 6

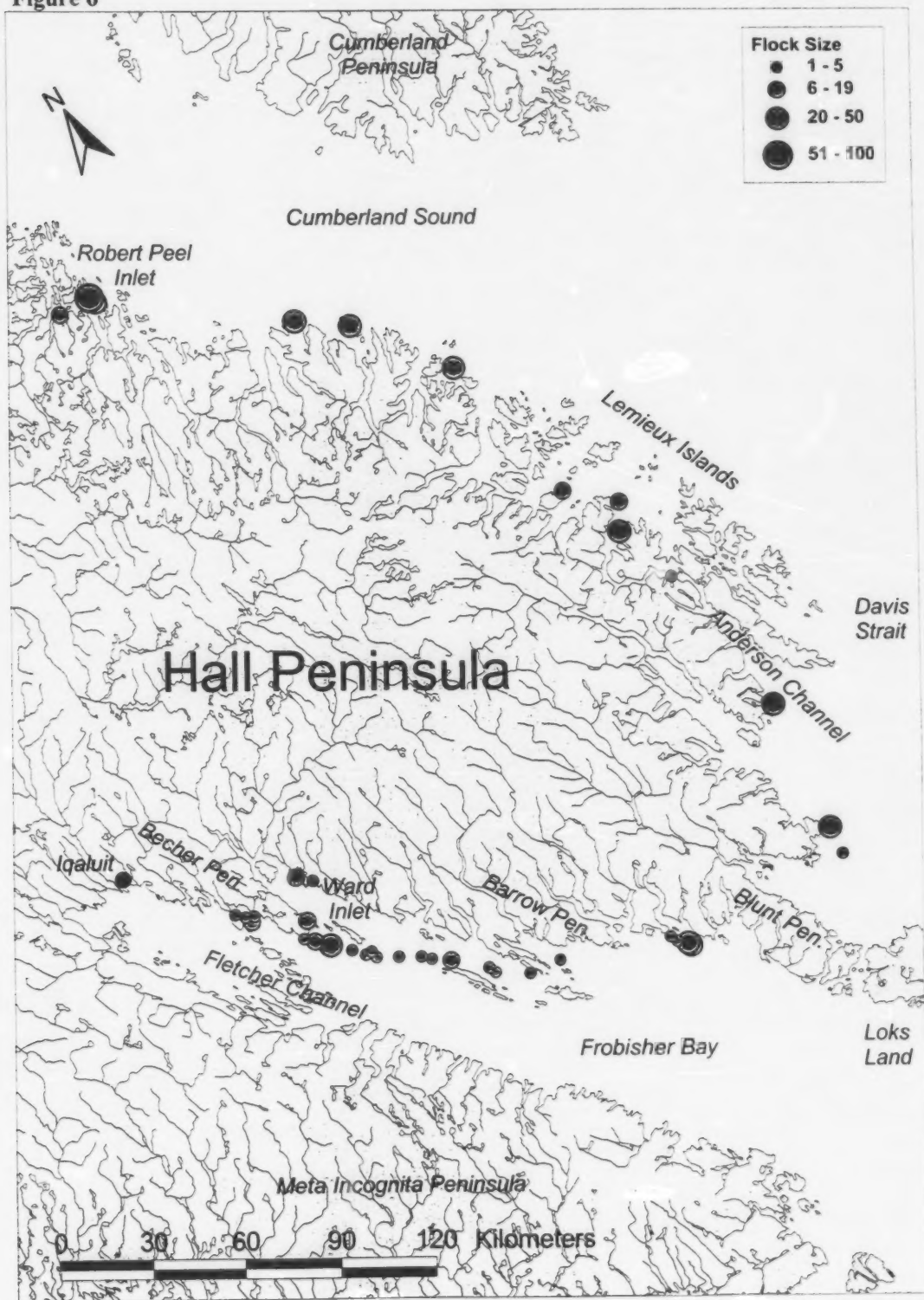


Figure 7

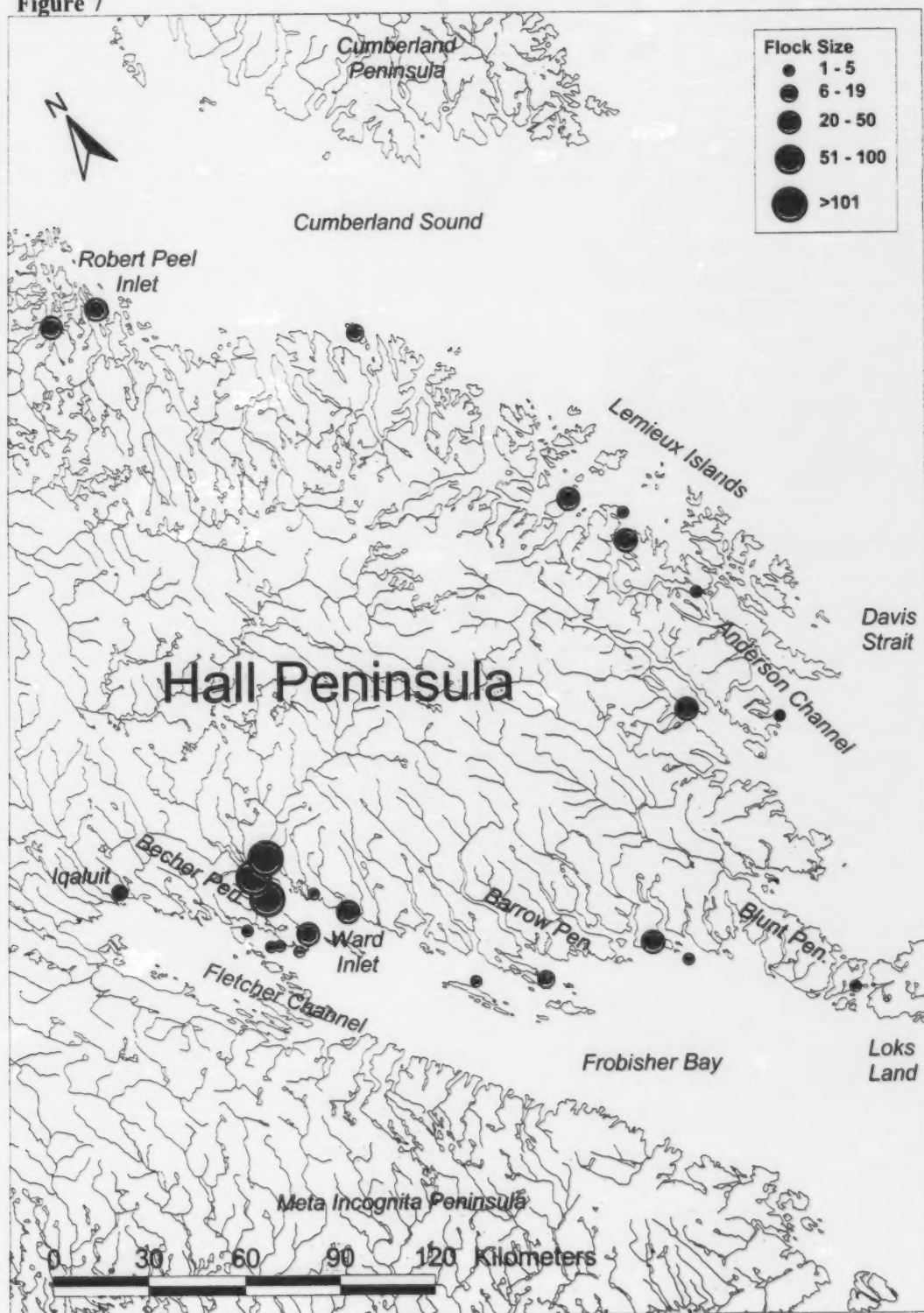


Figure 8

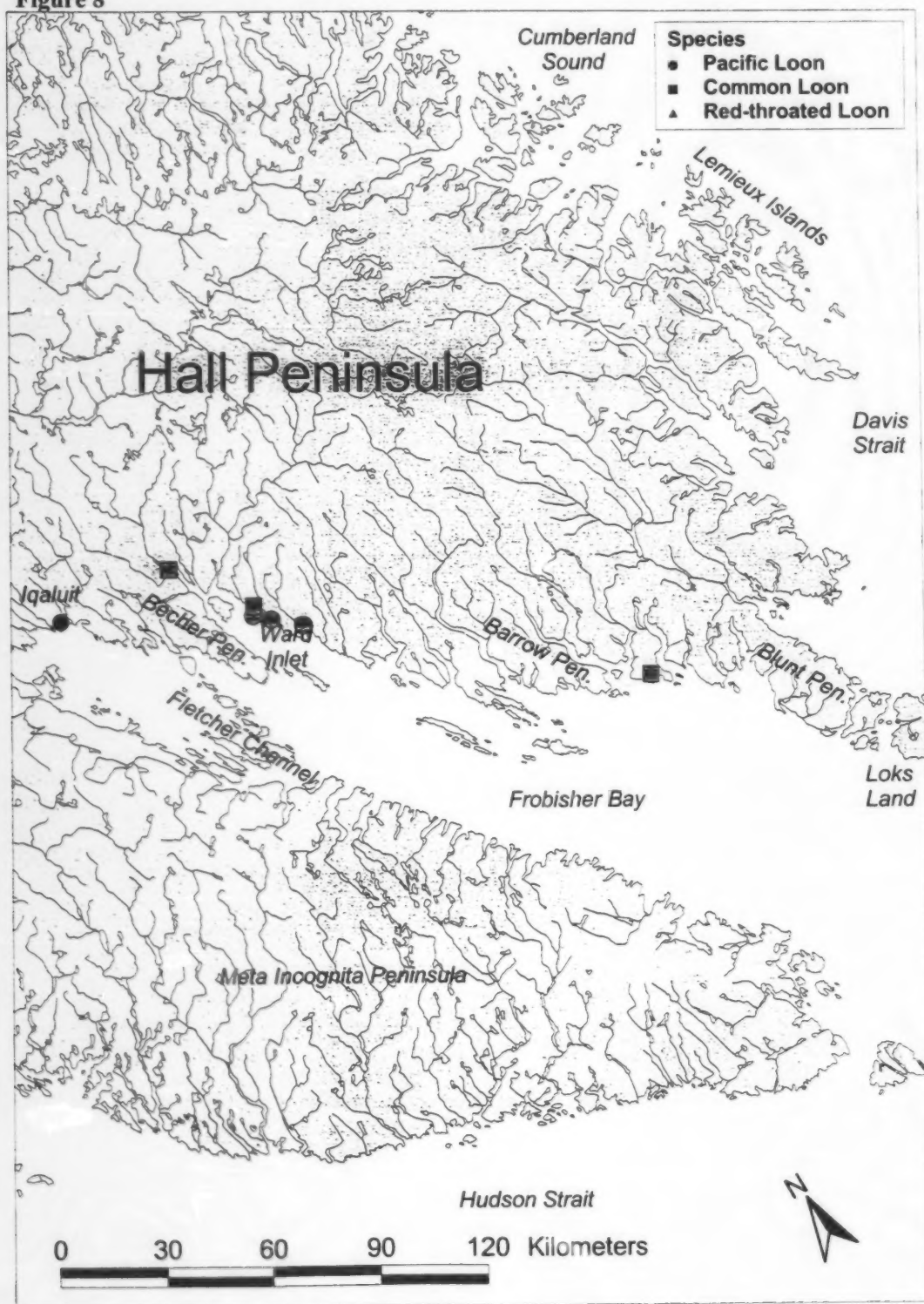
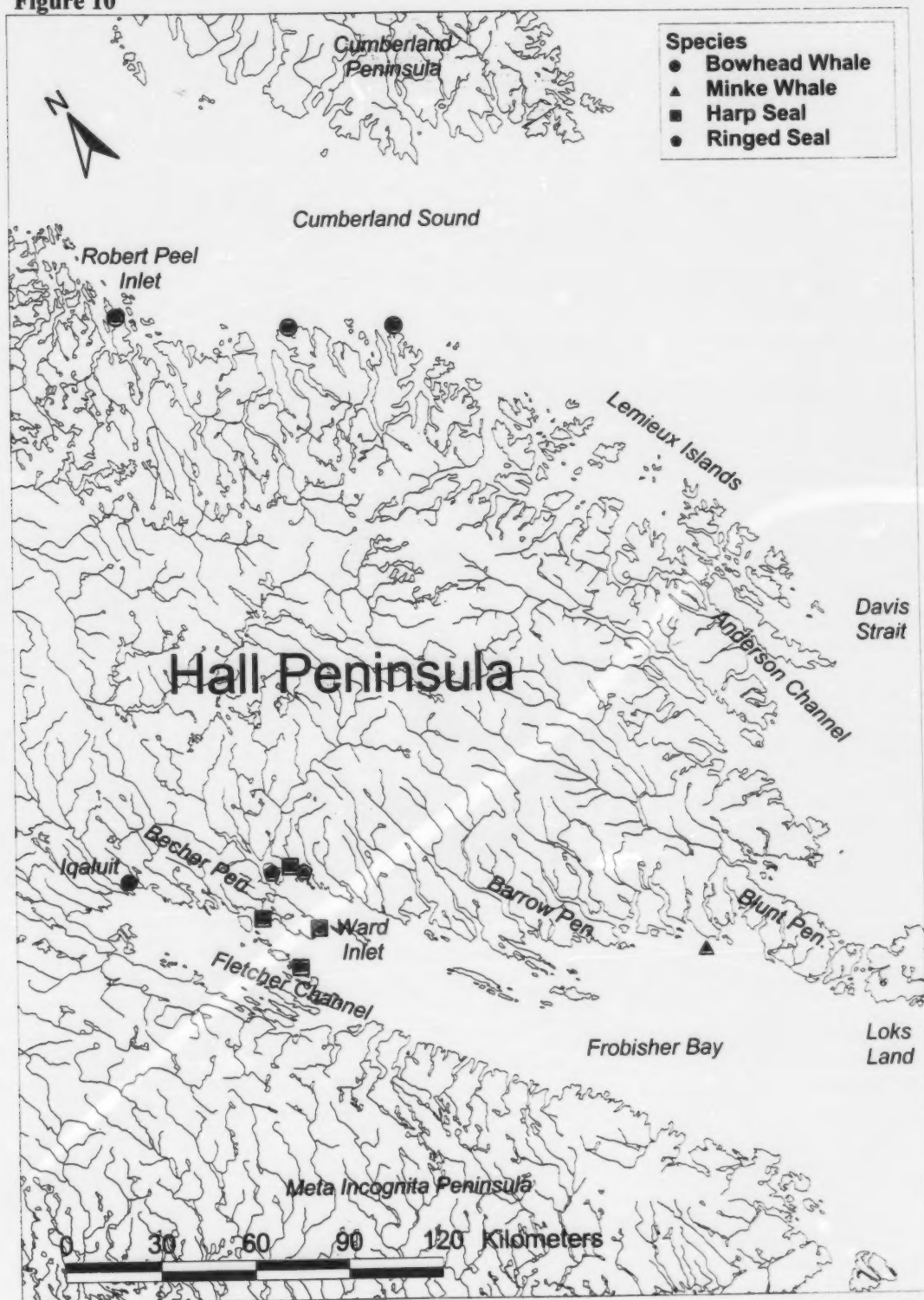


Figure 9



Figure 10



7. APPENDIX A

Table 2. Flock Size and coordinates of common eiders (*Somateria mollissima*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/02/00	37	62°59'N	66°30'W
08/02/00	40	63°00'N	66°38'W
08/02/00	40	63°01'N	66°45'W
08/02/00	1	63°04'N	66°50'W
08/02/00	3	63°11'N	67°11'W
08/03/00	69	62°32'N	64°56'W
08/03/00	12	62°34'N	64°47'W
08/03/00	45	62°34'N	65°12'W
08/03/00	27	62°39'N	65°19'W
08/03/00	12	62°41'N	65°22'W
08/03/00	160	62°42'N	65°27'W
08/03/00	6	62°45'N	65°32'W
08/03/00	12	62°47'N	64°33'W
08/03/00	9	62°48'N	65°27'W
08/03/00	20	62°48'N	65°37'W
08/03/00	80	62°49'N	64°36'W
08/03/00	12	62°50'N	65°42'W
08/03/00	12	62°51'N	64°43'W
08/03/00	7	62°51'N	65°44'W
08/03/00	8	62°52'N	65°45'W
08/03/00	25	62°53'N	65°47'W
08/03/00	200	62°54'N	66°02'W
08/03/00	45	62°55'N	65°50'W
08/04/00	12	63°54'N	64°42'W
08/05/00	45	63°25'N	64°56'W
08/05/00	32	63°38'N	64°29'W
08/05/00	3	63°41'N	64°30'W
08/05/00	40	63°42'N	64°33'W
08/05/00	50	63°43'N	64°35'W
08/05/00	45	63°45'N	64°38'W
08/05/00	45	63°46'N	64°52'W
08/05/00	16	63°58'N	64°36'W
08/06/00	3	64°44'N	65°15'W
08/06/00	5	64°47'N	65°29'W
08/06/00	8	64°52'N	65°46'W
08/06/00	45	65°12'N	66°51'W
08/06/00	12	65°13'N	67°06'W
08/26/00	17	63°24'N	67°19'W
08/26/00	20	63°25'N	67°21'W

08/26/00	1	63°29'N	67°54'W
08/26/00	31	63°30'N	67°29'W
08/26/00	16	63°32'N	67°30'W
08/26/00	15	63°32'N	67°34'W
08/26/00	30	63°32'N	67°45'W
08/26/00	20	63°34'N	67°47'W
08/26/00	32	63°39'N	67°38'W
08/26/00	4	63°44'N	67°51'W
09/14/00	3	63°23'N	67°37'W
09/14/00	45	63°35'N	67°43'W

Table 3. Flock Size and coordinates of king eiders (*Somateria spectabilis*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/02/00	5	63°14'N	67°19'W
08/02/00	40	63°15'N	67°24'W
08/02/00	12	63°19'N	67°36'W
08/02/00	1	63°20'N	67°39'W
08/02/00	8	63°24'N	67°48'W
08/02/00	21	63°26'N	67°52'W
08/02/00	3	63°32'N	68°04'W
08/03/00	45	62°34'N	65°12'W
08/03/00	2	62°53'N	66°01'W

Table 4. Flock Size and coordinates of long-tailed ducks (*Clangula hyemalis*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/03/00	19	62°39'N	65°18'W
08/03/00	50	62°54'N	66°02'W
09/14/00	2	63°23'N	67°38'W

Table 5. Flock Size and coordinates of Canada geese (*Branta canadensis*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/03/00	4	62°51'N	64°44'W
08/03/00	45	62°55'N	65°50'W
08/06/00	40	65°12'N	67°12'W
08/26/00	20	63°34'N	67°47'W
08/26/00	1	63°44'N	67°51'W

Table 6. Flock Size and coordinates of black guillemots (*Cepphus grylle*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/02/00	3	62°58'N	66°24'W
08/02/00	2	62°59'N	66°36'W
08/02/00	2	63°02'N	66°47'W
08/02/00	1	63°03'N	66°48'W
08/02/00	7	63°07'N	66°59'W
08/02/00	1	63°09'N	67°05'W
08/02/00	1	63°10'N	67°08'W
08/02/00	1	63°12'N	67°15'W
08/02/00	3	63°14'N	67°22'W
08/02/00	1	63°15'N	67°23'W
08/02/00	1	63°15'N	67°25'W
08/02/00	1	63°17'N	67°29'W
08/02/00	20	63°19'N	67°35'W
08/02/00	14	63°21'N	67°39'W
08/02/00	1	63°22'N	67°42'W
08/02/00	6	63°29'N	67°56'W
08/02/00	1	63°30'N	67°57'W
08/02/00	1	63°31'N	68°00'W
08/03/00	2	62°49'N	64°36'W
08/03/00	25	62°49'N	65°40'W
08/03/00	34	62°50'N	65°41'W
08/03/00	4	62°51'N	65°44'W
08/03/00	2	62°52'N	65°45'W
08/04/00	45	62°54'N	64°35'W
08/04/00	45	63°54'N	64°42'W
08/05/00	45	63°16'N	64°28'W
08/05/00	3	63°43'N	64°35'W
08/05/00	6	63°58'N	64°36'W
08/05/00	15	64°05'N	64°52'W
08/06/00	45	64°32'N	65°03'W
08/06/00	30	64°47'N	65°29'W
08/06/00	45	64°52'N	65°46'W
08/06/00	45	65°12'N	66°51'W
08/06/00	60	65°13'N	66°52'W
08/06/00	8	65°13'N	67°06'W
08/26/00	12	63°25'N	67°38'W
08/26/00	2	63°29'N	67°54'W
08/26/00	1	63°30'N	67°29'W
08/26/00	12	63°32'N	67°34'W

Table 7. Flock Size and coordinates of glaucous gulls (*Larus hyperboreus*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Flock Size	Latitude	Longitude
08/02/00	8	62°59'N	66°30'W
08/02/00	4	63°04'N	66°52'W
08/02/00	1	63°23'N	67°44'W
08/02/00	2	63°25'N	67°49'W
08/02/00	2	63°26'N	67°52'W
08/02/00	4	63°30'N	67°57'W
08/03/00	3	62°32'N	64°56'W
08/03/00	2	62°50'N	65°42'W
08/03/00	45	62°55'N	65°50'W
08/04/00	45	63°54'N	64°42'W
08/05/00	2	63°16'N	64°28'W
08/05/00	45	63°25'N	64°56'W
08/05/00	2	63°41'N	64°30'W
08/05/00	2	63°58'N	64°37'W
08/05/00	25	64°05'N	64°52'W
08/06/00	10	64°47'N	65°29'W
08/06/00	25	65°12'N	66°51'W
08/06/00	45	65°13'N	67°10'W
08/26/00	20	63°25'N	67°21'W
08/26/00	40	63°25'N	67°38'W
08/26/00	3	63°30'N	67°29'W
08/26/00	105	63°33'N	67°45'W
08/26/00	300	63°37'N	67°46'W
09/14/00	2	63°35'N	67°43'W
09/14/00	705	63°39'N	67°38'W

Table 8. Flock Size and coordinates of loons (*Gaviidae*) observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Species	Flock Size	Latitude	Longitude
08/03/00	Common loon	3	62°55'N	65°50'W
08/26/00	Pacific loon	3	63°27'N	67°20'W
08/26/00	Pacific loon	1	63°30'N	67°29'W
08/26/00	Pacific loon	5	63°32'N	67°34'W
08/26/00	Common loon	3	63°33'N	67°32'W
08/26/00	Common loon	1	63°44'N	67°51'W
08/26/00	Red-throated loon	2	63°44'N	67°51'W

Table 9. Flock Size and coordinates of uncommon bird species observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Species	Flock Size	Latitude	Longitude
08/26/00	Gyr Falcon	1	63°42'N	67°48'W
08/26/00	Gyr Falcon	1	63°44'N	67°51'W
08/02/00	Northern fulmar	1	63°04'N	66°52'W
09/14/00	Red-breasted merganser	1	63°35'N	67°43'W
09/04/00	Sabine's gull	4	63°40'N	68°30'W
08/02/00	Thick-billed Murre	1	63°05'N	66°53'W
08/02/00	Thick-billed Murre	1	63°06'N	66°57'W

Table 10. Group Size and coordinates of marine mammals observed along the coastline of the Hall Peninsula, southern Baffin Island, August and September 2000.

Date	Species	Group Size	Latitude	Longitude
08/06/00	Bowhead whale	3	64°44'N	65°15'W
08/06/00	Bowhead whale	3	64°53'N	65°51'W
08/06/00	Bowhead whale	1	65°09'N	66°48'W
08/03/00	Large whale	1	62°48'N	65°37'W
08/26/00	Harp seal	15	63°29'N	67°54'W
08/26/00	Harp seal	12	63°35'N	67°35'W
09/14/00	Harp seal	40	63°19'N	67°50'W
09/14/00	Harp seal	10	63°23'N	67°37'W
08/26/00	Ringed seal	1	63°33'N	67°32'W
09/14/00	Ringed seal	1	63°23'N	67°37'W
09/14/00	Ringed seal	3	63°35'N	67°43'W